

Claims

1. An injection nozzle for an internal combustion engine, in particular in a motor vehicle,
 - having a first nozzle needle (3), which is embodied in the form of a hollow needle and is able to control an injection of fuel through at least one first injection opening (5),
 - having a second nozzle needle (4), which is situated coaxial to the first nozzle needle (3) and is able to control the injection of fuel through the at least one second injection opening (6),
 - having a control chamber (32),
 - having a second control piston (42) that axially cooperates with the second nozzle needle (4) or a second needle unit (30) that includes the second nozzle needle (4),
 - an end surface (45) of the second control piston (42) oriented away from the injection openings (5, 6) is situated in the control chamber (32), thus permitting it to be acted on with the control pressure prevailing therein,
 - in a closed position of the second nozzle needle (4), the second control piston (42) rests axially against the second nozzle needle (4) or second needle unit (30),

characterized in that

- a first control piston (41) embodied in the form of a hollow piston is provided, which cooperates axially with the first nozzle needle (3) or a first needle unit (17) containing the first nozzle needle (3),
- the second control piston (42) is situated coaxial to the first control piston (41),

- a first control surface (43) of the first control piston (41) oriented away from the injection openings (5, 6) is situated in the control chamber (32), thus permitting it to be acted on with the control pressure prevailing therein,
- in a closed position of the first nozzle needle (3), there is an axial play (44) between the first control piston (41) and the first nozzle needle (3) or first needle unit (17),
- the control chamber (32) communicates with a pressure chamber via a throttle line (33),
- it is possible to adjust an injection pressure in the pressure chamber (34).

2. The injection nozzle according to claim 1, characterized in that a first closing spring (20) is provided, which on the one hand, drives the first nozzle needle (3) or first needle unit (17) in the closing direction (21) and on the other hand, directly or indirectly drives the first control piston (41) into an initial position in which the axial play (44) is present between the first control piston (41) and the first nozzle needle (3) or first needle unit (17).

3. The injection nozzle according to claim 2, characterized in that

- the first closing spring (20) rests against the first control piston (41) by means of a drive ring (22),
- the drive ring (22) comes into axial contact with a stop (23) when it reaches the initial position of the first control piston (41).

4. The injection nozzle according to claim 3, characterized in that the stop is embodied on a stop sleeve (23) that is situated coaxial to the first control piston (41) and rests axially against a nozzle body (2) of the injection nozzle (1).

5. The injection nozzle according to one of claims 1 through 4, characterized in that the first control piston (41) constitutes a first stroke stop (53) for the first nozzle needle (3) or first needle unit (17) so that in an open position of the first nozzle needle (3), the first control piston (41) comes into direct axial contact with the first nozzle needle (3) or first needle unit (17).

6. The injection nozzle according to one of claims 1 through 5, characterized in that the first control piston (41) has a second stroke stop (55) for the second nozzle needle (4) or second needle unit (30) so that in an open position of the second nozzle needle (4), the first control piston (41) comes into direct axial contact with the second nozzle needle (4) or second needle unit (30).

7. The injection nozzle according to one of claims 1 through 5, characterized in that a second stroke stop (55'') for the second nozzle needle (4) is embodied directly on the first nozzle needle (3) or on a washer (56) of the first needle unit (17).

8. The injection nozzle according to one of claims 1 through 7, characterized in that a second closing spring (50) is provided, which axially rests directly or indirectly against the second control piston (42) and, by means of the second control piston (42), drives the second nozzle needle (4) or second needle unit (30) in the closing direction (21).

9. The injection nozzle according to claim 8, characterized in that the second closing spring (50) is situated in the control chamber (32).

10. The injection nozzle according to claims 8 or 9, characterized in that the second closing spring (50) rests against a spring plate (46) that rests axially against the second control piston (42), is able to move in the control chamber (32) in the axial direction, and enables a pressure compensation between its two axial sides (48, 49) oriented away from each other.

11. The injection nozzle according to claim 10, characterized in that the spring plate (46) is supported in the control chamber (32) in an axially movable fashion and has at least one pressure compensation opening (47) that connects the axial sides (48, 49) of the spring plate (46) so that they are able to communicate with each other.